CROP PRODUCTION

LEVEL-I

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Module Title: Performing Field Crop Production

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INTRODUCTION TO THE MODULE

This module covers the knowledge, skills and attitude required to Prepare tools and equipment for field crop production, under take field crop agronomic practices, clean up, store materials, equipment, record and document.

LG #1	LO #1 : Prepare inputs, tools and equipment for field crop production

Instruction sheet 1

This learning guide is developed to provide you the necessary information regarding the following content coverage and topics:

- Identifying the required inputs, tools and equipment
- Checking insufficient or faulty Materials, tools and equipment
- Manual handling and techniques loading and unloading
- Selecting and checking suitable Personal Protective Equipment (PPE).
- Identifying and reporting OHS hazards

This guide will also assist you to attain the learning outcomes stated in the cover page. Specifically, upon completion of this learning guide, you will be able to:

- Identify the required inputs, tools and equipment
- Check insufficient or faulty Materials, tools and equipment
- Use Correct manual handling and techniques for loading and unloading materials to minimize damage to the load, person and the vehicle
- Select and Check suitable Personal Protective Equipment (PPE)
- Identify and report OHS hazards

Learning Instructions:

1. Read the specific objectives of this Learning Guide.
2. Follow the instructions described below.
3. Read the information written in the information Sheets
4. Accomplish the Self-checks
5. Perform Operation Sheets
6. Do the “LAP test”

Information Sheet 1

Introduction

Crop is the term used to describe a plant that is grown in a field on a large scale. For example, cereal crops, pulses and fruit crops.

Field crop is an agricultural crop (such as hay, grain, or cotton) grown on large areas.

Crop is the produce of cultivated plants or the seasonal total yield of cultivated plants

Production: - the act or an instance of production; the process of being produced a total yield

Crop production: a systematic and planned production of cereals, pulses, oil crops, root and tuber crops, fiber crops, beverage crops... for profit or subsistence.

1.1 Identifying and Checking inputs, tools and equipment

The agricultural crop work is an activity that are **determining the cropping activity** either it could be in the **field crops, horticultural crops or stimulant and spice crops**. The activities are: -land preparation, fertilization, irrigation, raking, weeding, harvesting etc.

according to each cropping system, therefore you will provide support on these activities by preparing the land as your supervisor directs you as the enterprise standard or work place information.

Tools and equipment's for agricultural crop work includes materials used during land preparation, cultivation, fertilizer and pesticide application, irrigation and harvesting and post harvesting materials.

The implements which are used to perform agricultural work operations are called **agricultural implements.**

Therefore, you need to know these tools and equipment's by their name and should identify those tools and equipment's physically.

Some modem inputs like Seeds/planting materials**,** Inorganic Fertilizer**,** Bio-fertilizer**,** Compost**,** Pesticides**,** Lime have been used in crop production by the sampled farmers during the 2003/04 crop season. Among these, the most widely used farm inputs by almost all the sampled farmers

were mineral fertilizers. Crop Inputs can be placed in four main sectors: seed, fertilizer, crop protection, and service.

Tools and equipment's used during field crop production are: Hand tools, Knapsack, box, Machetes, sickles, fencing tools, measuring tools, hoes, spades, packing equipment, water can, etc.

1.1.1 Tools and equipment's used during land preparation and cultivation

- Shovel
- Fork



- Spade

Spade used for:

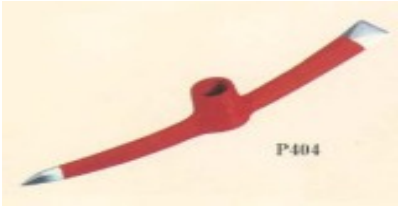
- Making furrow and ridges
- Manage the flow of water in irrigated agriculture.



- Hoes

Hoe used for

- Soil preparation.
- Weed destruction.
- Mixing soil with fertilizer and compost



- pick axe

- Rakes



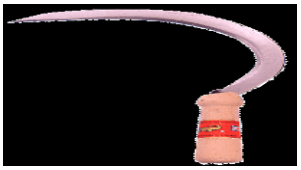
- Tractors, tractor mounted implements (disc plow, moldboard, disc harrow, leveler, riders)

1.1.2 Tools and equipment's used during fertilizer and pesticide application

- Fertilizer applicator (similar to planter)
- Pesticide sprayers
    a. Tractor mounted sprayers
    b. Knapsack sprayers

1.1.3 Tools and equipment's used during Harvesting and post harvesting

- basket
- bags
- sacks
- Sickles



- Machetes
- Combine harvester



Figure 1.1. Hand tools used for field crop production

1.2 Checking insufficient or faulty Materials, tools and equipment

Check all the tools and equipment's before use, are all the materials functional and sufficient in number? Are all clean of any contaminants? Then check and report to your supervisor how much of the materials he provided in the list are functional and how much of them are faulty. Then are the functional tools and equipment's sufficient enough to the field crop production with the available labor power. Then after reporting the faulty and functional materials your supervisor will guide you what to do if there is insufficiency of material for that particular field crop production.

1.3 Manual handling and techniques loading and unloading

1.3.1 Definition of terms

Loading is a weight placed on something else; a burden or a substance added to something else; a filler.

Unloading is to take away or off or remove Workers unloaded cargo and to get rid of or be freed from a load or burden.

Loading and **unloading** means the process of getting goods and equipment in and out of the stallholders' vehicles and setting up or taking down the stall or pitch. The difference between load and unload is that load is to put a load on or in (a means of conveyance or a place of storage) while unload is to remove the load or cargo from (a vehicle, etc.). Put the heaviest side of the load closest to your body. Keep your head up and look ahead, not down at the load, and avoid twisting or leaning sideways. If you need to, put the load down and adjust your grip before continuing the lift.

1.3.2 Proper handling of the items or materials during loading and unloading

We already separated faulty materials not to be transported to working area, however while loading and unloading we should take the necessary care not to break, holing, etc. and not to make any of these materials faulty for the next time work, by properly handling materials we can prolong the time of service they can give and also minimize the cost of buying new materials in replacement to faulty once.

Therefore, the care we should take during loading and unloading includes the following dos and undos

- Do not through materials from ground on to the vehicle
- Do not through materials from vehicle on to ground
- Hold and place materials one by one rather than making more than one or two
- When placing materials on the vehicle place them in stable position
- Place materials on ground in stable position
- Place similar materials together on the vehicle while loading and on ground when unloading

1.3.3 Taking care of vehicle during loading and unloading

As already mentioned in the above topic, if materials will not be loaded properly, it is not only the materials that will be affected but also the vehicle as well. If we through materials from ground on vehicle we could break the glasses of the vehicle, we might hurt the loading surface and lead to fast depreciation of the vehicle. We might also create a problem when unloading materials improperly.

The first principle in loading and unloading materials is hold the material properly in both hands, keeping balance and safely placing the materials on vehicles or on ground, for these purposes at least two or more people are necessary one or more on the vehicle and one or more on ground.

1.3.4 Types of loading and unloading techniques

Responsible for the quality and safety of products, the process of loading and unloading consists of **loading goods properly**. In this sense, the products must be placed carefully in the vehicles that will make the transport, and removed with the same attention when arriving at the final destination.

1.4 Selecting and checking suitable Personal Protective Equipment (PPE)

Personal protective equipment is to include that prescribed under legislation, regulations and enterprise policies and practices. Face masks are available for rubbing back and painting.
Suitable personal protective clothing and equipment is selected, used, maintained and stored in accordance with Occupational Health and Safety requirements.
Some of personal protective equipment's are: Boots, Hat/hard hat, Overalls, Gloves, Protective eyewear, Hearing protection, face mask, Sun protection, e.g., sun hat, sunscreen

1.5 Identifying and reporting OHS hazards

Definition: Occupational health and safety is concerned with health and safety in its relation to work the working environment.

Aims of occupational health

Occupational health should aim at: -

- ✓ The promotion and maintenance of the highest degree of physical, mental and social well-being of workers in all occupation

- ✓ The prevention amongst workers of departures from health caused by their working conditions.
- ✓ The protection of workers in their employment from risks resulting from factors adverse to health.
- ✓ The placing and maintenance of workers in an occupational environment adapted to his physiological and psychological capabilities and
- ✓ To summarize the adaptation of worker to man and of each man to his job.

Work place hazards

The various work place environmental factors or stresses that may cause sickness, impaired health, or significant discomfort or inefficiency in works may be classified as chemical, physical, biological and ergonomic.

A. Chemical hazards

Chemical hazards include the followings;

I. Dusts: Are substances consisting of solid particles that have been reduced to small size by some mechanical process. E.g. silica, coal, asbestos, lead cotton, wood, cement. Dust from earth, hay and straw is not in itself very dangerous for the lungs because it is no siliceous as mine or quarry dust. It may, however, hamper breathing, may also hamper perspiration by clogging the pores of the skin, may be dangerous for the eyes, and may carry other contaminants (fungi, bacteria, and so on) which cause illness. It is not always easy to provide protection against dusts. Very often workers will not wear a dust masks because working in a mask is extremely uncomfortable, especially in hot climate.

II. Mist: Suspension in air of very small drops usually formed by mechanical means (atomization) or by condensation from the gaseous state.

E.g. acid mists

III. Gases: Substance that will diffuse to evenly occupy the space in which it is enclosed. A gas does not appear in the solid state or liquid state at standard temperature and pressure.

E.g. **chlorine, Sulphur dioxide, ethylene oxide, ozone** etc.

IV. Fumes: Substances composed of solid particles formed by condensation from a gaseous state, these particles are microscopically small (odorous)

E.g. **smoke**

V. vapors: Gaseous form of a substance that is normally a liquid or solid.

E.g. **alcohols**

B. Physical hazards

All work places encounter some agents of the physical environment which have potential to present health hazards at work.

The **physical hazards** can be:

1. Noise: absorbed through the ear: Noise from farm tools and machinery can cause permanent hearing loss. Hearing loss may be temporary at first, but repeated exposure will lead to permanent damage.

The damage can occur gradually over a number of years and remain unnoticed until it is too late. Some noises, such as gunshots are so loud they can cause immediate permanent damage:

Once hearing is gone, it is gone forever and hearing aids are of little help. They can make speech lauder but they can't make it clearer.

Typical farm noises that can damage hearing include:

- Tractor
- Chainsaw etc.

C.Biological hazards

Biological hazards, also known as biohazards, refer to biological substances that pose a threat to the health of living organisms, primarily that of humans. This can include medical waste or

samples of a microorganism, viruses, or toxins (from a biological source) that can affect human health.

Biological health hazards include bacteria, viruses, parasites and moulds or fungi. They can pose a threat to human health when they are inhaled, eaten or come in contact with skin. They can cause illness such as food poisoning, tetanus, respiratory infections or parasite infection.

D. Ergonomic hazards

Ergonomic hazards are physical factors in the environment that may cause musculoskeletal injuries.

These include repetition, awkward posture, forceful motion, stationary position, direct pressure, vibration, extreme temperature, noise, and work stress

Self-check 1	Written test

Name…… ID…… Date…….

Directions: Answer all the questions listed below.

Test I: Choose the best answer (2 point each)

1. _____ is a weight placed on something else; a burden or a substance added to something else; a filler.

A. Loading B. Unloading C. Handling D. Reporting

2. Which one is not chemical hazard?

A. Dusts B. Noise C. Gases D. Fumes

3. Which one is/are not function of hoes?

A. Soil preparation B. Weed destruction

C. Making furrow and ridges D. Making furrow and ridges

4. _____ is concerned with health and safety in its relation to work the working environment.

A.PPE B.OHS C. Handling D. Field crop

5. A plants grown and harvested by man for economic purpose refers to:

A. Field crop B. Crop production C. Productivity D. Crop

Test II: Short Answer Questions (2 points each)

1. What does field crop mean?
2. What is the difference between loading and unloading?
3. Write Tools and equipment's used during land preparation and cultivation
4. Define the term "PPE" and "OHS"?
5. Write the tools and equipment's used during loading and unloading?

Note: Satisfactory rating - 10 points Unsatisfactory - below 10 points

Operation Sheet -1

1.1 Techniques of identification of materials, tools and equipment

A. Tools and equipment

- ✓ Personal protective equipment's (PPE)
- ✓ Trowel
- ✓ Spade
- ✓ Seed
- ✓ Shovel
- ✓ Pick-mattock
- ✓ Rake
- ✓ Hoe
- ✓ Axe
- ✓ Fertilizer, etc.

B. Procedures/Steps/Techniques

1st - use a list of materials provided by your supervisor and then classify the materials according to their purpose as materials used during land preparation, cultivation or harvesting, etc. Your supervisor will provide you with list of materials used in field crop production.

2nd – know the name of the materials listed in your supervisors list

3rd – Identify all the materials physically one by one

4th – describe the use or purpose of each material

5th – check wear and tears of each material

6th – separate a material which doesn't have best match with handle, broken, have hole on containers, not sharp/can be easily broken, or can't function relative to the purpose of the work or any other unspecified reasons.

7th – count the number of faulty, functional or material that can be maintained very easily.

8th – finally report to your supervisor.

1.2. Techniques of loading

1.2.1. Techniques of loading and unloading

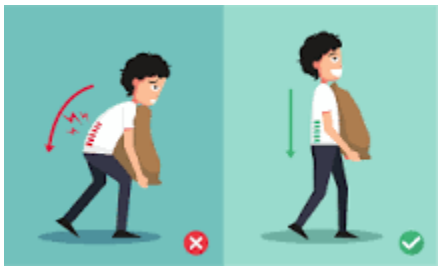
A. Tools and equipment

I. Lifter
II. push carts, animal drawn carts
III. Personal protective equipment
IV. Hand cart
V. Ladder
VI. Wheelbarrow

B. Procedures/Steps/Techniques

The procedures/steps for loading and unloading are as follows:

1. Wear appropriate personal protective equipment
2. Check the package before loading
3. Ensure vehicle is stopped, braked, and stabilized before loading/unloading.
4. Loading areas should be well lit at all times.
5. Loading areas should be free from hazards.
6. Loading area should be free of traffic.



Notice: Before loading and unloading your materials you will be provided with field crop production materials in the store, vehicle on which to load materials and suitable personal protective equipments.

Additionally, we can use the below steps/techniques if necessary.

1. First go to the store and check that the different field crop producton materials are already there the vehicle provided and you are also ready to load materials by wearing the suitable personal protective equipments
2. Then group yourself in pair of two person or more persons

3. Open the back or the side of the carriage for easy loading if necessary, for loading the materials you should take care of the vehicles glasses or the vehicle could be carriage and a tractor.
4. Let one person or one group be on the vehicle and the other group on ground
5. Let the group on ground take materials from store and give it for his counterpart on the vehicle, note material should be taken one by one, or if suitable two by two or more if suitable
6. Let the group or person on the vehicle receive the material from the person on the ground and place it on the vehicle. Note the materials should be placed orderly and safely, by note throwing the materials on the vehicle.
7. Finally close the back side of the carriage and move to the site of agricultural crop work or unload the materials
8. Use the same procedure above for unloading

LAP TEST-1	Performance Test

Name……. ID……..

Date…….

Time started: _____ Time finished: _____

Instructions: Given necessary templates, tools and materials you are required to perform the following tasks within **1** hour. The project is expected from each student to do it.

Task-1 Perform identifying materials, tools and equipment's

Task-2 Perform loading and unloading

LG #2	LO #2- Undertake field crop agronomic practices

Instruction sheet 2

This learning guide is developed to provide you the necessary information regarding the following content coverage and topics:

- ✓ Observing and Saving appropriate environmental conditions for agronomic practices
- ✓ Conducting field crop agronomic practices
- ✓ Observing Workplace procedures in relation to workplace practices, handling and disposal of materials

This guide will also assist you to attain the learning outcomes stated in the cover page. Specifically, upon completion of this learning guide, you will be able to:

- Observe and Safe appropriate environmental conditions for agronomic practices
- Conduct field crop agronomic practices
- Observe Workplace procedures in relation to workplace practices, handling and disposal of materials

Learning Instructions:

1. Read the specific objectives of this Learning Guide.
2. Follow the instructions described below.
3. Read the information written in the information Sheets
4. Accomplish the Self-checks
5. Perform Operation Sheets
6. Do the "LAP test"

Information Sheet 2

2.1 Observing and Saving appropriate environmental conditions for agronomic practices

Definition

Agronomic practices mean agricultural practices generally associated with field crop production, including soil management, cultivation, and row cropping.

Agronomic practices may include the following.

2.1.1. Site selection

Site selection is the process of examining multiple options and assessing their relative advantages and disadvantages. Site selection comes after the needs assessment is completed. If you select a site before the need's assessment, you may compromise on key design aspects due to site limitations

Site selection is the single most important factor in fruit production and can make a pronounced difference on how well and abundantly fruit will grow. Planting location can have a significant effect on potential production

Land availability, land use, public sentiment and other community issues can have dramatic influence on site selection. In any site selection process, local involvement and judgments regarding the relative significance of selection criteria are important.

2.1.2 Land preparation: Land preparation is clearing and removal of bushes on the surface of the land, this is performed differently, but the two main practices are, one or two ploughing followed by harrowing, ridging and mulching. The size of the land, costs and machines available dictate the methods to use for land preparation.



2.1.3 Seed sowing: Seed sowing is defined as placing the seed in soil to germinate and grow into plant, but planting is putting the plant to propagules in soil for growing plants. Propagules are seedlings, roots, tubers, leaves, or cuttings.



2.1.4 Weeding

The act of removing wild plants from a place where they are not wanted

Methods to control your weeds

I. Mowing and Cutting. Mowing and cutting can decelerate the production of seed and can limit the growth of weeds

II. Weed Pulling

III. Stabbing

IV. Mulching

V.Tilling

VI.Soil Solarisation.

VII. Flooding

2.1.5. Fertilizer Application

Fertilizers are applied to replace the essential nutrients for plant growth to the soil after they have been depleted. Excess amounts of fertilizers may enter streams creating sources of nonpoint pollution. Fertilizers most commonly enter water sources by surface runoff and leaching from agricultural lands.

Fertilizers are mainly classified into two main types, organic and inorganic fertilizers.

The role of fertilizers is to increase yield and ensure healthy produce by supplying the right balance of nutrients to the soil. "Without fertilizers, the soil would be depleted and therefore plants would be particularly difficult to grow.

2.1.6. Pest management

Pest management is an important component of crop production. Pests can have a detrimental effect on horticultural operations by affecting the quantity, quality and ultimately, the marketability, of the crops grown. A pest is any animal, insect, weed or disease that attacks a crop.

2.1.7. Harvesting

Harvesting is the operation of gathering the useful part or parts of the plant and is carried out at the time when all the nutrients have developed and the edible parts have reached the appropriate degree of maturity. In general, the harvest takes place 10 or 15 days after the grain has reached physiological maturity.

Relevant agronomic practices include those that reducing pollution, improving soil fertility, and enhancing biodiversity can minimize the impacts of agricultural production on natural ecosystems and the services they provide. These also include appropriate matching of crop, soil type, and irrigation methods

You will be given instructions and directions by supervisor and clarification sought when necessary. Your supervisor will provide the necessary information about land preparation, planting, managing, picking, packing, loading and transporting techniques and storing. Your supervisor will also provide the necessary personal protective clothes help you to practice your work in safe manner. Safe work manner can be defined as practicing the without causing injury to the person, environment and yourself.

2.1.1 Undertaking Cropping work in a safe and environmentally appropriate manner

Favorable agro climatic conditions

I. Environmental factors

It includes: - Temperature, Relative humidity, Solar radiation, Wind velocity and direction Evaporation etc.

A. solar Radiation: solar energy is the source of energy for all physical processes taking place in the atmosphere. The intensity, quality, duration and direction of light affects plant growth and development.

Duration of light: This is a considerable importance for the farmer in selecting a crop variety. The length of the day has greater influences than light intensity.

Plants can be classified as.

I. short day plant: which develop and produce flowers normally when the photoperiod is less than a critical maximum (<12 hours of illumination)

II. Long day plants: which develop and produce flowers normally when the photoperiod is greater than a critical minimum (>12 hours of illumination).

III. Day- neutral plants: which are found to be unaffected by photoperiod.

- E.g. tomato, sunflower, cotton, etc.

Note: The relative length of day and night not only influence flowering but also affect the processes like initiation of leaves and tillers.

Direction of light: shoots, roots and leaves show different orientation to the direction of light

B. Temperature: It is the degree of sensible heat or cold within the atmosphere. The instrument that measures temperature is called thermometer.

1. It depends upon latitude, altitude, proximity to the sea, prevailing winds, etc. it decreases in general from the equator towards the poles.
2. Every plant community has its own minimum, optimum and maximum temperatures known as their cardinal temperatures.
3. The temperature below the minimum and above the maximum limits is lethal to the crop growth and development.

In general, Influence of temperatures on crop plants are:

- ✓ seed germination
- ✓ crop growth and development
- ✓ pollination
- ✓ seed setting & ripening

C. Wind: is the movement of air in a horizontal direction over the surface of the earth.

- It affects plant growth and development mechanically and physiologically. For good wind pollinating plants bright sunny weather with gentle wind for good seed set required.

D. Rain fall: The amount and distribution of rainfall influences the crops considerably. Crops differ in their requirement of rainfall:

Excess rainfall is detrimental to crop growth as it affects soil fertility and productivity

- Excess amount of rainfall results in: -
  - ✓ Flooding water logging
  - ✓ Soil erosion
  - ✓ Favors diseases and insect pests

Rainfall analysis helps in taking decisions on:-

- Time of planting
- Irrigation scheduling
- Time of harvesting
- Leveling effect

E. Relative humidity: It is defined of the ration between the actual quantity of water vapor in a given volume of air and the amount of water vapors could be held by that mass of air at the same temperature and under the same atmospheric pressure. It is expressed in percentage.

In general, RH has an influence on:

1.Leaf growth: Under high amount of relative humidity, turgor pressure will occur due to less transpiration.

- ❖ Moderately, ample relative humidity can **favor leaf growth enlargement**.

2. Photosynthesis: When relative humidity is low, transpiration increases causing H_20 deficient in the plant which causes partial or full closer of stomata and increase its resistance/blocking the energy of Co_2. Thus, photosynthesis is affected.

3. Pollination: When relative humidity is high pollen may not be dispersed from anther.

- ✓ Moderately, ample air humidity is favorable to seed set in many crops–provided soil moisture supply is adequate.

4. **Pests:** High relative humidity favors incidence of insect pests and diseases.

5. **Grain yield:** Very high or low relative humidity is not conducive for grain yield

II. Topography and soil factors

Topographic features or landscape of an area such as degree of slope and soil types has a marked effect on crop growth. Relatively level topography or plain has a distinct advantage in producing field crop by favoring mechanical field equipment. Thus, land selected for producing field crop should be flat or gentle slope.

Land with steep slope will later leads to erosion problem. In the absence of favorable slope, one can use the sloppy land for producing field crops, if and only if, the landscape allows construction of conservation structure to minimize the erosion, that would otherwise, leads to heavy erosion after eliminating the original vegetation of the land. Therefore, it is highly recommended that do not produce field crops on land with a steepness of more than 15% without any effective method controlling soil erosion.

Soil factors are another very important condition for producing field crops. Most of the crops perform well on deep, fertile, well drained soils with a moderate PH range.

2.1.1 Factors Affecting Field Crop Production

A. Environmental factors: -

I. Light: The sun provides almost all the energy used on the earth's surface. This energy is received in the form of electromagnetic radiation of varying wavelengths transmitted through space and the earth's atmosphere.

Components of solar radiation and their effects on plants

Light type	Effect on plants
1. Ultraviolet	Detrimental (harmful, damaging)
2. Visible	Photosynthetic
3. Near infrared	Morphogenetic
4. Far red	Energy balance

II. Rainfall: Rainfall is the most significant climatic element affecting crop production in the tropics.

As much as 90% of cropping is rainfed.

The rains are generally seasonal, having distinct wet and dry periods.

The time of onset of the rainy season and the total amount, distribution and duration of rainfall, as well as the time of its cessation, all contribute to the type and number of crops grown per season and their expected yield.

B. Soil environment and crop growth

- Soil is a natural medium for plant growth.
- **Soil provides:**
  - ✓ Anchorage
  - ✓ Essential food in the form of nutrients
  - ✓ Water and air
- Physical, chemical and biological properties of soil influences crop growth right from sowing to harvesting.

- Unlike climatic conditions which are less amenable to modification, the soil environment can be altered substantially by tillage, application of manure and fertilizers, irrigation and drainage etc. for reducing mechanical resistance and providing adequate nutrients, water and air for proper growth and development of crops.

C. Soil fertility and plant nutrients

Soil fertility: - the inherent capacity of the soil to supply nutrients to plants in suitable proportion and adequate quantity to produce crops of economic value and to maintain the health of the soil without deterioration.

Soil productivity: - the capacity of the soil to produce crops with a specific management system and is expressed in terms of yields.

Essential plant nutrients

- Plants need 20 elements for their growth and development.
- Macronutrients: - C, O, H, N, P, K, Ca, Mg and S.
- Micronutrients: - Fe, Mn, B, Z, Cu, MO and Cl.

2.1.2 Classification of Crop Plants

Crop plants are classified in several ways:

I. Agronomic classification

Identifies a plant's agricultural use and their gross similarities.

A. Cereal crops: These crops are grown for their edible grains rich in carbohydrate. They include Wheat, Barley, Tef, Maize, Sorghum, F. Millet, etc.

B. Pulses/grain legumes: - These crops are grown for their edible grains rich in quality protein. They include Faba bean, Field pea, Cow pea, Soybeans, Lentils, etc.

C. Root & tuber crops: - These are grown for their enlarged roots or tubers.

Important root and tuber crops are Cassava, Sweet potato, Potato, Yam, etc.

D. Fiber crops: - They grow for their fiber and these includes Cotton, Sisal, Kenaf, etc

E. Oil crops: - These crops are grown for their edible oil.

They include Sesame, Sunflower, Safflower, Rape seeds, Linseed, ...

F. Sugar crops: - Grown for their sugar content and includes Sugar cane (60% sugar come from this crop in the world), Sugar beet (40% sugar from this crop).

G. Drug crops: - These crops are smoked or chewed for their stimulant effect.

They include Tobacco, Chat

H. Beverage crops: - These crops are also sources of stimulants.

They include Coffee, Tea, Cocoa

I. Vegetable crops: - This group includes Tomatoes, Onions, Cabbages, Lettuce, Carrot, Cucumber, ...

J. Fruit crops: - This group includes perennial fruit bearing crops.

They include Papaya, Mango, Avocado, Banana, ...

K. Forage crops: - Crops grown as feed for ruminants.

They are fed to the animals either fresh or in dried form, such as hay and silage (e.g. Alfalfa)

II. Special purpose classification

The name of the group is often derived from the purpose for which the crop is used. Many of the crops previously mentioned are well suited for more than one purpose. Some of the special purpose groups are as follows.

A. Cover crops: - These crops are sown so as to make a growth to cover or protect the soil. Example Alfalfa, Vetch, Cow pea, ...
B. Green – manure crops: - Those crops, which are grown to be plowed under or to be disked into the soil to increase its productivity. As a rule
   - ❖ Legumes are more desirable than non legumes
   - ❖ Fast growing crops are preferred to slow growing
   - ❖ High biomass producing crops are preferred to low biomass-producing crops. Example Cow pea, Vetch, Sesbania, ...
C. Catch or emergency crops: - crops used as substitutes for staple crops that have failed on account of unfavorable conditions. They are quick growing crops. E.g. millet and chickpea
D. Soiling crops: - Those crops that are cut/harvested green and fed green to cattle directly from the field at their succulent stage. E.g. Alfalfa, Clover, Grasses, maize, ...
E. Companion crops: - It is an inter-cropping system. e.g. legumes and cereals

F. Trap crops: - Planted to attract pests.

III. Classification based on life cycle or habit

This type of classification attempts to classify plants based on their life habit.

- ❖ Annuals: - These are plants that complete their growth and maturity in one season and then dies. E.g. Wheat, Barley, Faba bean, ...
- ❖ Biennials: - Plants that persist for two growing seasons. They grow vegetatively during the first year and started flowering and seed production during the second year. E.g. Lettuce, Cabbage, ...
- ❖ Perennials: - These types of plants persist for more than two growing seasons. E.g. most of fruit crops.

IV. Classification based on the season of cultivation

Crops may be classified based on the seasons they are grown in. E.g. Belg or Meher season crops; or alternatively summer or winter season crops.

V. Botanical/Binomial/Scientific/ classification

- ➢ Scientific nomenclature of plants was first used by Carolus Linnaeus.
- ➢ He developed binomial (two name) systems in which plants identified by both genus and species.
- ➢ This system of nomenclature, which is universally, accepted in the scientific community forms the basis for the science of plant taxonomy.
- ➢ Plants are classified according to seven categories:

  Kingdom ---- division (phylum) --- class --- order --- family --- genus --- species

- ➢ Sub classification may be recognized in each category.
- ➢ This system, which attempts to group plants according to their evolutionary relationships, is based on the identification of ancestral plant forms.
- ➢ Although close to 300,000 different species of plants have been classified under the binomial system, only 30,000 are of any value in food and feed production and of

these only 15 species (Rice, Wheat, Maize, Barley, Sorghum, Sugar cane, Sugar beet, Potato, Sweet potato, Cassava, Bean, Peanut, Soybean, Coconut and Banana) make a significant contribution to the food supply of the world.

- The binomial system of plant nomenclature is used universally among scientists because it is accurate and minimizes the possibility of giving multiple names for same plant.
- Based on this classification, field crops belong to division of plant kingdom spermatophyte (plants that reproduce by seeds). Within spermatophyte:
  - Angiosperms: plants/crops whose seed is enclosed in ovary.
    - Monocotyledons: grass family with one cotyledon.
    - Dicotyledons: these are plants, which have two cotyledons.
  - Gymnosperms: forest trees whose seed is not in closed in ovary.
- The two main families to which field crops belong are:
  - Gramineae/poaceae: grass family (Wheat, Barley, Maize, Sorghum, etc.)
  - Leguminous/Fabaceae: legume family (faba bean, lentil, chickpea, etc.)
- Other crop families include Solanaceae (tomato, potato), Compositeae (sunflower), Malvaceae (cotton), Vigaceae (flax), etc.

2.2 Conduct field crop agronomic practices

Factors that affect agriculture are climate and temperature, soil and topography, landforms, availability of water and labor. Topography, soil and climate are the main physical factors affecting agriculture. Topography/relief: Topography is associated with land cultivation difficulties, soil erosion, and poor transport networks and facilities. Agriculture can be mechanized, depending on the topography of the land used.

What are the practices of crop production? Preparation of Soil, Sowing of Seeds, Irrigation, application of manure, pesticides, and fertilizers to the crops, Protecting and Harvesting Crops, Storage and Preserving the produced Crops.

The ultimate stages of crop production are harvesting and storage.

2.2.1 Cropping Systems

- **What is Cropping System?** It is crop production activity on a farm.
  - It comprises all cropping patterns grown on the farm, and their interaction with farm resources, other household enterprises, and the physical, biological, technical and socioeconomic factors or environments.
  - It refers to the way and manner in which the farmer actually organizes growing of crops and how he/she arranges them in his/her fields. It includes the scheduling and cultivation of various crops with a farm enterprise in a given agricultural year.
  - Consisting of practices how to grow and harvest crops and the environmental, social and political factors that bear on production and utilization.
- When we are talking about cropping systems, we are interested in:
  - what kinds of crops are grown in an area at a time
  - how those crops are distributed on the field at a time and how this distribution changes as time goes on
  - how the technical and managerial resources/inputs that are utilized are integrated

Why cropping system? (Objectives)

- ❖ Maximization of production (productivity)
- ❖ Profitability
- ❖ Sustainability
- ❖ Meet customers need

- ➢ Cropping systems has often evolved in response to:
  - climatic conditions
  - soil resources
  - available crop species
  - socio-economic priorities
  - proximity to urban centers
- ➢ Two important and interrelated factors that influence the evolution of a cropping system are:
  - I. the availability of suitable land for cultivation, and
  - II. the productivity of the land with respect to the farmers' requirements for total production in any given year
- ➢ Efficient cropping systems in dryland includes:
  - ❖ introduction of promising genotypes matching the rainfall pattern,
  - ❖ inclusion of legume components to build up soil fertility and save inorganic fertilizer N use,
  - ❖ stable, productive and remunerative intercropping systems,
  - ❖ inclusion of oilseeds and fodder components, and
  - ❖ double or triple cropping systems wherever possible.

2.2.2 Terms & Definitions Related to Cropping System

Multiple cropping - The intensification of cropping in **temporal** and **spatial** dimensions; growing two or more crops on the same field in one year. They are two types.

I. **Sequential cropping** - growing two or more crops in sequence on the same filed per year.
   - ➢ The time dependent form of multiple cropping.

- Farmers manage only one crop at a time in the same field, i.e. the second crop is planted after the first crop is harvested.
- There is no inter-competition among the crops.
- Sequential cropping systems are customarily encountered where resource endowments, especially water availability, are adequate than in intercropping systems.
- The sequential cropping systems utilize higher inputs and income maximization is a more important objective than in the case of intercropping.
- Sequential cropping can be **double, triple, and quadruple cropping** (i.e. the sequential growing of two, three, and four crops respectively on the same land in the same year) or **ratoon cropping** (cultivation of crop re-growth after harvest, although not necessary for grain).

II. **Intercropping: -** growing of two or more crops simultaneously on the same filed.

- The space dependent form of multiple cropping.
- Crop intensification is in both temporal and spatial dimensions; i.e. farmers manage more one crop at a time in the same field.
- There is inter-competition among crops during all or part of crops growth.
- Intercropping systems tend to be low input, risk reducing under dry farming situations for crop diversification and fulfillment of subsistence objectives.
- Intercropping could be mixed, row, strip and relay intercropping.
    - **Mixed intercropping**: - growing two or more crops simultaneously with no distinct row arrangement; often referred to as mixed cropping.
    - **Row intercropping**: - growing two or more crops simultaneously where one or more crops are planted in rows.
    - **Strip intercropping**: - growing two or more crops simultaneously in different strips wide enough to permit independent cultivation but narrow enough for crops to interact agronomically.
    - **Relay cropping**: - growing two or more crops simultaneously during the part of the life cycle of each. But all crops are not planted at the same time.

The second crop is planted after the first crop has reached a certain growth stage but before it is ready for harvest.

- **Sole cropping**: - growing one crop variety alone in pure stand at normal density.
- **Monoculture**: - the repetitive growing of the same crop on the same land.
- **Crop rotation**: - the repetitive cultivation of an ordered succession of crops (or crops and fallow) on the same land. That is growing different crops, one at a time, in a definite sequence on the same piece of land. One cycle may take several years to complete.
- **Continuous Cropping: -** Whereby land is cultivated on a continuous basis, either by rotation, mono-cropping or mixed cropping.
- **Agro forestry**: - It is a collective name for land use systems in which woody perennials (trees, shrubs, etc.) are grown in association with herbaceous plants (crops, pastures, etc.) and/or livestock in a spatial arrangement, a rotation or both, and in which there are both ecological and economic interactions between the tree and non-tree components of the system.
- **Alley cropping**: - an agro forestry system in which food crops are grown in alleys formed by hedgerows of trees and shrubs, preferably, legumes. The hedgerows are cut back at planting and periodically pruned during cropping to prevent shading and to reduce competition with the associated food crops. The hedgerows are allowed to grow freely to cover the land when there are no crops.
- **Cropping index**: - the number of crops grown per annum on a given area of land multiplied by 100.
- **Cropping pattern**: - the yearly temporal and spatial arrangement of crops or crops and fallow on a single area.

2.2.3 Types of Cropping Systems

Classification of cropping systems is extremely difficult. This is partly because the cropping systems themselves do not fall into discrete groups; instead there is a continuous array of systems from the simplest to the most complex.

- However, some classify cropping systems based primarily on the intensity of cropping, while others have combined this intensity factor with the nature of the crop, i.e. whether it is a tree crop, arable crop or grassland.
- Based on the intensity of cultivation, the cultivation frequency (R) is given as:

$$R = \frac{\text{No. of years of cropping (cultivation)}}{\text{No. of years in the rotational (total) cycle}} \times 100$$

- Where the number of years in the rotational cycle is the sum of the cropping and fallow periods.
- Cultivation frequency R, therefore, represents that proportion of the cultivated land currently under crops.
- The majority of small-scale farms follow natural fallow systems, in which pasture crops are not planted to any significant extent, but some natural regeneration of vegetation is achieved during the fallow period.
- The main categories of cropping systems based on this classification system include:

Shifting cultivation: - (R< 30),

Semi-intensive rain fed systems (30< R < 70)

Intensive rain fed system (R > 70)

Irrigated and flooded systems

- ✓ Irrigated upland systems
- ✓ Flooded ‘wet’ rice systems

Mixed annual/perennial systems (including agro forestry)

a. Annual crops in association with perennial crops
b. ‘Mixed garden’ system
c. Annual crops in association with herbaceous perennials or semi-perennials

Example: - one-year cropping and nine years fallow; 1/1+9 X 100 = 10%

- A slightly different approach might be to classify cropping systems on the basis of the following criteria considering simultaneously:
  - the distribution of the crops in time, i.e. whether shifting cultivation, continuous cropping, monoculture, or crop rotation is practiced
  - the distribution of the crops in space on the field, i.e. whether intercropping or sole cropping is practiced
  - the level of management and resources utilized to produce the crops, i.e. whether production is intensive or extensive
  - The type of crop grown, i.e. whether orcharding, arable cropping, pasturing, forestry, etc. is practiced.

Inter-cropping

The alternative system to sole cropping is the growing of two or more crops simultaneously on the same piece of land is called Inter-cropping.

- ✓ Crops do not necessarily to be planted or harvested at the same time.
- ✓ Main requirement is that they are at the same piece of land at the same time for a significant part of their growing periods.
- ✓ Cropping is intensified both in terms of time and space.

Types of inter-cropping systems differentiated on the basis of the arrangement of the crops in the field include: -

1) Mixed inter-cropping: -two or more species mixed
2) Row inter-cropping: - two or more crops grown in separate rows
3) Strip inter-cropping - two or more crops in different strips wide enough for independent cultivation and narrow enough to interact agronomically.
4) Relay inter-cropping - a second crop is planted inside a stand of an existing sole crop at some time before the first crop is harvested.

General objectives/aims of inter-cropping systems include:

- ✓ To reduce the risk of total crop failure due to uncertain rainfall
- ✓ To have a variety of produces for food and feed requirements

- ✓ To maximize yield due to complementary effects of the component crops
- ✓ To improve soil fertility
- ✓ To spread the requirement of labor over a period of time
- ✓ To minimize the damage caused by weeds, insect pests and diseases

Mono cropping

Monocropping is an agricultural practice in which the same crop is planted year after year. The obvious advantage to monocropping is that it allows a farmer to specialize in a particular crop, which means that he or she can invest in machinery designed specifically for that crop, along with high-yield seeds that will generate a large volume of the crop at harvest.

From an environmental perspective, farming in this way is harmful for a number of reasons. For one thing, it severely depletes the soil, as the plant will strip the soil of the nutrients it needs. This forces farmers to use fertilizers, which can disturb the natural balance of the soil and contribute to a host of environmental problems, from pollution to desertification. The practice can also contribute to the proliferation of crop pests and diseases, which can be a serious liability when a farmer's land is planted exclusively with one crop.

Monocropping also generally reduces crop diversity, which is perceived as a bad thing both because the loss of biodiversity is unfortunate, and because if a crop does become subject to a particular pest or disease, it becomes especially vulnerable. In a world where only a few strains of corn are grown, for example, if a pest develops to attack one, it could devastate global crops, and farmers might not have another strain to fall back upon.

Additionally, the practice is very dangerous when natural disasters or shifting weather devastate a crop. A farmer with diverse crops could afford to take a small loss if one crop failed to yield, but in a region where only one crop is grown, the results can be catastrophic. Farmers may find themselves heavily in debt at the end of the season, and the lack of harvest could translate into famine or general hardship.

Crop rotation

Growing two or more crops one after the other in the same piece of land. It is advantageous that the succeeding crop belongs to a family different from that of the previous crop. The period of crop rotation may be for two to three years longer.

1. Better control of weeds**.** Crop rotation is intended to break the life cycle and suppress the growth of weeds. The sequential planting of different crops may check the development of any weed species and reduce weed growth especially if cover crops or green manures (click to read Cover Crops in Tropical Crop Farming) and tall-growing row crops are used as component rotation crops.

2. Better control of pests and diseases**.** Some pests and causal organisms of plant diseases are host specific. They attack certain crop species or those belonging to the same family but not others. For example, the problem with rice stem borer will continue if rice is not rotated with other crops of a different family. This is because food will be always available to the pest. However, if legume is planted as the next crop, then corn, beans and bulbs, the buildup of the pest will be disrupted because they will be deprived of food.

3. Improved soil structure and organic matter content**.** The alternate planting of deep and shallow rooted plants will break up the soil and reduce the effects of plow pan. The planting of soybean, other grain legumes, sweet potato and vegetables will return sufficient quantities of plant residues to the soil as their leaves drop on the ground or body parts are left on the field after harvest, instead of being burned as is commonly practiced with sugarcane. Green manures will add significant amounts of organic matter.

4. Improved soil fertility**.** The continuous growing of a single crop will result to the depletion of certain soil nutrients. With crop rotation, soil fertility will be promoted through alternate planting of crops having different nutrient needs. This will prevent the depletion of any one essential element present in the soil. Leguminous plants, because of their ability to accumulate nitrogen by fixing it from the air in association with Rhizobium bacteria, will improve soil fertility.

2.3 Observing Workplace procedures in relation to workplace practices, handling and disposal of materials

2.3.1 Handling materials, tools, equipment and machinery

Definition of terminologies

Handling: is the action of one that handles something or a process by which something is handled in a commercial transaction especially the packaging and shipping of an object or material (as to a consumer)

Disposal: is defined as getting rid of or giving away or a device installed in the drain of a kitchen sink to grind up garbage that is then flushed down the drain.

Materials handling in agriculture is concerned with the movement and handling of materials and products in a systematic manner from point of origin to destination. Movement may be in any direction horizontal, vertical or any combination of the two. Handling of agricultural materials and products is important, not only because of the work involved, but also because of its effect on costs, product quality and management. Materials handling costs account for as much as 25 percent or more of the total production cost for certain agricultural crops. These costs can be lowered with efficient materials handling systems in which the components are integrated to provide a smooth flow of materials.

The tools, equipment's, and materials should be returned to store on completion of the work after they have been cleaned and checked. Any dirt (soil, and other) adhering with the tools and equipment's should remove before storage. Similar tools should be stored separately without mixing with other tools which help you to identify easily. During performing work, some tools, equipment's and materials can be broken, detached the handle from the main part, so such damaged tools should be maintained if the problem is simple. The broken tools should be identified and store alone until maintained. When materials are broken highly and not be maintained by other experts, they should be disposed of according to supervisor's instruction.

2.3.2 Guide lines for handling materials, tools, equipment and machinery

Refresh your mind with safeties applied when using and storing materials, tools, equipment and machineries.

A good care should be taken of the materials, tools, equipment and machinery which would then have a long life (prolong the time of service), minimize the cost of buying new materials in

replacement to faulty once. It is not wise to keep workers sitting idle at critical periods of the work because of shortage of materials.

Self-Check – 2	**Written test**

Name…… ID…… Date…….

Directions: Answer all the questions listed below.

Test I: Multiple choice (2points each)

1.Growing two or more crops one after the other in the same piece of land refers to:

A. Intercropping B. Crop rotation C. Monocropping D. Alley cropping

2. What are the practices of crop production?

A. Preparation of Soil B. Sowing of seeds C. Pesticide D. All E. None

3. plants that complete their growth and maturity in one season is;

A. Biennial B. Annual C. Perennial D. All

4.Which one is/are the objective of cropping system?

A. Productivity B. Profitability C. Sustainability D. All E. None

II: Short Answer Questions (2 points each)

1.Describe the term" handling" and "disposal"?

2.What is cropping system?

3.Write the factors that affect agriculture?

Note: **Satisfactory rating - 7 points Unsatisfactory - below 7 points**

You can ask you teacher for the copy of the correct answers.

Operation Sheet -2

2.1Techniques/Procedures/Methods of handling materials, tools equipments and machineries

A. Tools and equipment

I. Spade
II. Hoes
III. Tractor
IV. Pick-axe
V. pick-mattock
VI. Rake
VII. Pesticide sprayer, etc.

B. Procedures/Steps/Techniques

1.Check that tools, equipment and machines are functional before start of the work

2.Check that machines/tractors are serviced

3.Use all tools, equipment and machines for what they are designed or constructed.

4.Clean the tools equipment and machines always before storing them away.

5.Store them in a neat, dry place.

6.Repair and maintain simple tools, equipment.

LAP TEST-2	Performance Test

Name……. ID……..

Date…….

Time started: _____ Time finished: _____

Instructions: Given necessary templates, tools and materials you are required to perform the following tasks within **1** hour. The project is expected from each student to do it.

Task-2 Perform handling materials, tools equipment and machineries

LG #3	LO #3- Clean up store, tools and equipment's

Instruction sheet 3

This learning guide is developed to provide you the necessary information regarding the following content coverage and topics:

- ✓ Storing waste material in a designated area
- ✓ Checking tools, equipment and machinery
- ✓ Cleaning and storing materials, equipment and machinery

This guide will also assist you to attain the learning outcomes stated in the cover page. Specifically, upon completion of this learning guide, you will be able to:

- Storing waste material in a designated area
- Checking tools, equipment and machinery
- Cleaning and storing materials, equipment and machinery

Learning Instructions:

1.Read the specific objectives of this Learning Guide.

2.Follow the instructions described below.

3.Read the information written in the information Sheets

4.Accomplish the Self-checks

5.Perform Operation Sheets

6.Do the "LAP test"

Information Sheet 3

3.1 Storing waste materials in designated area

3.1.1 Definition of waste material

Waste material is any materials unused and rejected as worthless or unwanted.

Agricultural wastes include crop residues, weeds, leaf litter, sawdust, forest waste, and livestock waste.

Crop residues are materials left in an agricultural field after the crop has been harvested.

The major components of waste materials are food waste, paper, plastic, metal and grass, although demolition and construction debris is often included in collected waste, as are small quantities of hazardous waste, such as electric, light bulbs, batteries, automotive parts and discarded medicines and chemicals.

Waste material includes Plant debris, litter and broken components, Plastic, metal, or paper-based materials. Straws, etc.

Broadly speaking, waste materials are either liquid or solid in form, and their components may be either hazardous or inert in their effects on health and the environment. The term waste is typically applied to solid waste, sewage (wastewater), hazardous waste, and electronic waste.



Figure:3.1 Waste material liquid/solid

Waste can be classified into five types of waste which are all commonly found around the house. These include liquid waste, solid rubbish, organic waste, recyclable rubbish and hazardous waste.



Figure:3.2 Waste material of different hazardous waste

3.1.2 Storing waste materials

Tools and equipment should be stored and disposed according to the manufacturer's specifications, enterprise procedures and regulations. This is used to increases life span of tools and equipment and avoids scarcity of tools and equipment at critical periods.

After completion of all field establishment activities all containers, leftover fluids, waste and debris should be disposed safely and appropriately. Waste materials which may be toxic to human beings or pollutants environmental conditions should be properly disposed to minimize hazards.

3.1 Checking tools, equipment and machinery

Farm machinery means all machines and tools that are used in the production, harvesting, and care of farm products, and includes trailers that are used to transport agricultural produce.
Common types of farm machinery include the tractor, bulldozer, tillage, machines, planters, sprayers, motor-saws, harvesters and others. The Tractor This is a powerful motor-vehicle

Machineries: The use of bulldozers for clearing is very common to establish large scale farms. The Bulldozers operate by uprooting the trees, shrubs and pushing the plant material to some designated trash areas of the field to perform burning.

The disadvantages of bulldozers are:

- Bulldozers are heavy machines & cause considerable soil compaction.
- Bulldozer operation reduces organic matter from the soil.

Plough implements: - Modern ploughs are used to open the soil & pulverize it. Ploughs are also used to incorporate the crop residues & manures. Implements may be of animal drawn or power operated.

1. Mould Board plough: - It is an improved tillage implement over local country plough. It used for departing a layer of soil from the under lying subsoil and is inverted.
2. Disc Plough: - Have steel disc of 50-90 cm diameter. The discs are made of hard high carbon steel & have sharp cutting edge. The discs are set at an angle to the direction of travel. It is very suitable where soils having hard plough pan. It works where M.B. plough does not work, particularly in sticky soils. It is a tractor drawn because of their weight & size.

3. Harrows: - it is suitable for the preparation of land after ploughing in grassland & virgin lands & also for incorporation of manures.
4. Cultivators: - Secondary tillage implements used after initial ploughing of the soil. They are used for pulverization & to bring the soil to desired tilth. They destroy weeds & mix manures & fertilizer with the soil.
5. Ridging plough: - A double MB plough having adjustable wings with which the width can be suitably altered at the rear. May be animal or tractor drawn.
6. Paddling plough: - used for paddling in wet lands.
7. Dry land welders: - manually operated and used for removing weeds in line sown crops under dry land condition.

3.2.Cleaning and storing materials, equipment and machinery

Cleaning is the removal of dirt and organic substances from surfaces of tools and equipment.

Through the cleaning procedures, high numbers of microorganisms (90% and more) present on the mentioned objects will be removed. However, many microorganisms stick very firmly to surfaces, in particular in tiny almost invisible layers of organic materials and will not entirely be removed even by profound cleaning but persist and continue multiplying.

Inactivation of those microorganisms requires antimicrobial treatments, carried out through hot water or steam or through the application of disinfectants. Disinfectants are chemical substances, which kill microorganisms but should not affect human health through hazardous residues and not cause corrosion of equipment.

The first step in equipment cleaning is to physically remove scrap, i.e. coarse solid particles, with a dry brush or broom and shovel. This is usually referred to as “dry Cleaning”. Using large amounts of water to remove this material would be extremely wasteful and eventually cause drains to clog and waste water treatment facilities to become overloaded.

More profound clean-up procedures require water in sufficient quantities.

Manual Cleaning using brushes or scrapers is widely applied in small-scale operations although labor and time-intensive

The seven-step cleaning process includes emptying the trash; high dusting; sanitizing and spot cleaning; restocking supplies; cleaning the bathrooms; mopping the floors; and hand hygiene and inspection. Remove liners and reline all waste containers.

Before the evolution of mechanized equipment, farming in the colonial period was mainly done through the use of the plow, axe, scythe, and the hoe. Colonists drilled fields using iron-blade hoes while plows were used by those individuals that are wealthy enough to own horses.

Most large agricultural equipment can be cleaned quickly with a high pH (alkaline) detergent, foamer to apply the chemical and a high pressure rinse. Using a high pressure rinse to break up very large clumps of mud prior to cleaning is recommended. For best results, chemicals should be applied to a dry surface

Self-Check – 3	Written test

Name…… ID…… Date…….

Directions: Answer all the questions listed below.

Test I: Short Answer Questions (4 points each)

1.What does waste material mean?

2. Write at least 3 examples of waste material?

3. What is cleaning?

4. write the six stages of cleaning?

Test I: Multiple choice (4 points each)

1.Common types of farm machinery include:

A. Tractor B. Machines C. Planters D. All

2. Which one is used for digging the soil & making bunds & ridge?

A. Spade B. Shovel C. Sickle D. Hoes

Note: **Satisfactory rating - 12 points Unsatisfactory - below 12 points**

You can ask you teacher for the copy of the correct answers.

Operation Sheet -3

3.1Techniques/Procedures/Methods of Cleaning and storing materials, equipment and machinery

A. Tools and equipment's

I. Scrub brush

II. Water

III. Vacuum cleaner

IV. Micro-fibber cleaning, etc.

V.Boom

B. Procedures/Steps/Techniques

1.Remove loose debris and substances from the contaminated surface you're cleaning. ...

2.Main Clean

3.Rinse

4.Disinfection

5.Final Rinse.

6.Drying.

7. Finally store them in a neat, dry place.

LAP TEST-3	Performance Test

Name……. ID……..

Date…….

Time started: _____ Time finished: _____

Instructions: Given necessary templates, tools and materials you are required to perform the following tasks within **1** hour. The project is expected from each student to do it.

Task-3 Perform cleaning and storing materials, equipment and machinery

LG #4	LO #4- Recording and documenting

Instruction sheet 4

This learning guide is developed to provide you the necessary information regarding the following content coverage and topics:

- ✓ Reporting problems or difficulties in completing work
- ✓ Recording and reporting materials, equipment and machinery condition
- ✓ Reporting work activities and outputs in Standard format

This guide will also assist you to attain the learning outcomes stated in the cover page. Specifically, upon completion of this learning guide, you will be able to:

- Report problems or difficulties in completing work
- Record and reporting materials, equipment and machinery condition
- Report work activities and outputs in Standard format

Learning Instructions:

1.Read the specific objectives of this Learning Guide.

2.Follow the instructions described below.

3.Read the information written in the information Sheets

4.Accomplish the Self-checks

5.Perform Operation Sheets

6.Do the "LAP test"

Information Sheet 4

4.1 Reporting problems or difficulties in completing work

Reporting is informing all information related to the work to a person who concerns about. It helps to the supervisor and other concerned persons to know the standard of the work and at what level the work activities are found and also help to supply solution by concerned people if problems are there.

There are a number of problems occurred during crop production, of which some of them are as follows:

a. Faultiness of the tools and equipment
b. Lack of materials for maintaining tools and equipment
c. Lack of personal protective closes
d. Unsuitability of personal protective closes
e. Lack of materials, tools and equipment during the work
f. Lack of agricultural inputs,
g. Loss of tools and equipment during the work
h. Damage to the vehicle etc.

The problems occurred during undertaking crop work should be reported to the supervisor so that there will be solution for the coming work cycle.

4.1.1 Documenting and recording relevant information

Record-keeping and documentation are important processes that facilitate:

- Continuity of care
- Accountability
- Service improvement
- facilitate communication
- to provide relevant client information
- to conduct evidence-based research

What should be documented?

- History and needs of customer.
- Services provide.
- fees charged and subsidies received
- Client outcomes.

4.1.2 Best practices for documentation

To ensure consistency, it is best to bear in mind the following when documenting case notes:

- ✓ Concise.
- ✓ Relevant information in appropriate detail,
- ✓ Accurate.
- ✓ Up-to-date.
- ✓ Meaningful.
- ✓ Internally consistent. Notes should be structured according to a preset format

4.2 Recording and reporting materials, equipment and machinery condition

Definition of terminologies

Recording is the state or fact of being recorded or something that records: such as, something that recalls or relates past events or an official document that records the acts of a public body or officer and an authentic official copy of a document deposited with a legally designated officer.

Reporting is the presenting of news in newspapers, on radio, and on television, etc. in an honest way and impartial political reporting.

Reporting in crop production context

Crop reporting is the description of the crop in the growing stage, mentioning the present condition involving yield status and pest management with comments for improvement.

Documentation is the act or an instance of furnishing or authenticating with documents. It is the use of historical documents or conformity to historical or objective facts.

As a form of knowledge management and knowledge organization, documentation can be provided on paper, online, or on digital or analog media, such as audio tape or CDs.

Examples are user guides, white papers, online help, and quick-reference guides. Paper or hard-copy documentation has become less common.

4.3 Reporting work activities and outputs in Standard format

Work activity is the systemic entity of purposeful, cooperative human action, where several actors work in an organized way upon a shared object of work to transform it into an intended outcome, by using different kinds of means of work and means of cooperation and coordination.

A work report is a formal document that discusses information about a specific topic related to an aspect of your job. Most work reports are addressed to a particular audience, such as a manager. Depending on the type of work report, you may be given a report brief that outlines what you should include in your report.

How to write a work report

1. Identify your audience.
2. Decide which information you will include
3. Structure your report.
4. Use concise and professional language
5. Proofread and edit your report.

Recording

Once the hazards are identified it should be recorded. The record should include the type crop work, how the risk occurs, and the likely solution, etc. The table below can serve as a recording format, or you can make a better recording format.

No	**Type of crop work activity**	**The type risk**		**Possible solutions**	
		Man	**Environment**	**Man**	**Environment**

On completion of crop work out comes like productivity, production, strengths of production, weaknesses of production, and problems of production should be reported to you supervisor according to instructions and formats given from the supervisor. The work outcomes can vary depending on objective; it can be fruit, seeds, leafy parts, stem parts, flowers, lawns, etc. Reporting work out come helps you to get feedback by your supervisor so that you can leave your weakness and encourage your strength. It also helps the supervisor to get full information about the production.

The reporting format may vary but it can be as follows:

No	Work activities	Input	Production (quintal/hr	Price	Out put	Problems	Expectations

Self-Check – 4	Written test

Name…… ID…… Date…….

Directions: Answer all the questions listed below.

Test I: Short Answer Questions (4 points each)

1.What is reporting?

2.Define the term crop reporting?

3.What does documentation mean?

Test I: Multiple choice (4 points each)

1.What should be documented?

A. History and needs of customer B. Services provide

C. outcomes D. All

2._____ is a formal document that discusses information about a specific topic related to an aspect of your job.

A. Work report B. Documenting C. Handling D. None of the above

Note: **Satisfactory rating - 10 points** **Unsatisfactory - below 10 points**
You can ask you teacher for the copy of the correct answers.

Operation Sheet -4

4.1 Techniques/Procedures/Methods of recording and reporting work activities and out puts

A. Tools and equipment

I. Flip chart
II.Marker
III.Ruler
IV.Note book
V.Pen

B. Procedures/Steps/Techniques

1.Observe the work activities carefully

2.Record the problems or difficulties

3.Record and report materials, equipment and machinery according to their functionality

4.Report work activities and outputs.

LAP TEST-4	Performance Test

Name……. ID……..

Date…….

Time started: _____ Time finished: _____

Instructions: Given necessary templates, tools and materials you are required to perform the following tasks within **1** hour. The project is expected from each student to do it.

Task-4 Perform recording and reporting work activities and out puts

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